SPCC REQUIREMENTS AND POLLUTION PREVENTION PRACTICES FOR OIL PRODUCTION, DRILLING AND WORKOVER FACILITIES

About the Compliance Assistance Guides...

The U.S. Environmental Protection Agency (EPA) has prepared this series of guides for owners and operators of oil facilities to help you better understand the Federal Oil Pollution Prevention regulation. This regulation has two sets of requirements -- the Spill Prevention Control and Countermeasure (SPCC) plan rule (an oil spill *prevention* program), and the Facility Response Plan (FRP) rule (an oil spill *response* program). You *must* comply with these requirements if you meet the applicability provisions set out in each rule. You can find the Federal Oil Pollution Prevention regulation in Title 40 of the Code of Federal Regulations (CFR) part 112 (40 CFR part 112). The CFR is available at Federal Depository Libraries around the country, many of which are on the campuses of major colleges and universities. The CFR is also available online at **http://www.gpo.gov**. Be aware that the series is *guidance* only; you should review the regulation if you think it applies to you.[1] A complete list of Oil Spill Program outreach guides and information on obtaining them appears in the "Compliance Assistance Guides" section at the end of this document. Or you may find the series at EPA's Oil Spill Program Website at **http://www.epa.gov/oilspill**.

What will I find in this guide?

This guide, *Requirements and Pollution Prevention Practices for Oil Production, Drilling and Workover Facilities* -

- Describes the equipment and operations a oil production, drilling, and workover facility owner or operator needs to address to prepare and implement a satisfactory SPCC Plan;

- Recommends practices for preventing pollution and discharges* of oil; and

- Briefly discusses FRP applicability.

***** You can find the definition of "discharge" in 40 CFR 112.2.

Before reading this guide, you should read the *Introduction and Background to the Oil Pollution Prevention Regulation,* in the Compliance Assistance Guides.

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[1]This guidance is based on the existing SPCC/FRP rule and policies in effect on August 30, 1994. This guidance may change as the SPCC rule is revised.

What kind of facility is SPCC-regulated?

EPA's SPCC requirements (40 CFR 112.1 through 112.7) apply to onshore and offshore non-transportation-related facilities that could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines, and that have (1) a total underground buried storage capacity of more than **42,000** gallons; (2) a total aboveground oil storage capacity of more than **1,320** gallons; or (3) an aboveground oil storage capacity of more than **660** gallons in a single container. SPCC applicability is dependant on the tank's maximum design storage volume and not "safe" operating or other lesser operational volume.

An *onshore* production facility may include all wells, flowlines, separation equipment, storage facilities gathering lines, and auxiliary non-transportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator. An *offshore* oil drilling production, or workover facility may include all drilling or workover equipment, wells, flowlines, gathering lines, platforms, and auxiliary non-transportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator.

Your facility may not be regulated if, due to its location, it could not reasonably be expected to discharge oil into navigable waters of the U.S. or the adjoining shorelines.

What are Navigable Waters of the U.S.?

Section 502(7) of the Clean Water Act, defines the navigable waters of the United States as the following:

1) All navigable waters of the United States, as defined in judicial decisions prior to passage of the 1972 FWPCA (Pub. L. 92-500), and tributaries of such waters;
2) Interstate waters;
3) Intrastate lakes, rivers, and streams which are utilized by interstate travelers for recreational or other purposes; and
4) Intrastate lakes, rivers, and streams from which fish or shellfish are taken and sold in interstate commerce.

The term navigable waters also includes the territorial seas, as defined in 40 CFR 110.1.

What do I need to do?

♦ ***In General***

If you are the owner or operator of an SPCC onshore or offshore oil production, drilling, or workover facility; you *must* have a written site-specific spill prevention plan, which details your facility's compliance with 40 CFR part 112. Requirements for specific elements to include in the SPCC Plan are found in 40 CFR 112.7. Once your Plan is completed, a Registered Professional Engineer who is familiar with the SPCC requirements and has examined your facility must review and certify the Plan. Most importantly, you *must* fully implement the SPCC Plan. If your facility is newly constructed or recently modified, you *must* prepare or revise your SPCC Plan within six months. Modifications may include, for example, changes in piping arrangements or tank installation or removal.

♦ ***Pollution Prevention and Control Measures for Certain Onshore and Offshore Oil Facilities***

Be certain that your Plan addresses all of the applicable requirements for oil pollution prevention and control. Paragraph (e)(5) of 40 CFR 112.7 sets out various spill prevention and control measures that should be addressed in your SPCC Plan for an onshore oil production facility. Paragraph (e)(6) does the same for onshore oil drilling and workover facilities. Paragraph (e)(7) sets out spill prevention and control measures for offshore oil drilling, production, or workover facilities. Finally, paragraphs (e)(8) through (e)(10) set out various measures for onshore and offshore oil drilling, production, and workover facilities.

General Requirements for Containment and Diversionary Structures (40 CFR 112.7[c])

All SPCC-regulated facilities, including onshore and offshore oil production, drilling, and workover facilities, *must* have oil spill containment and diversionary structures to prevent oil spills and contaminated runoff from reaching storm drains, streams (perennial or intermittent), ditches, rivers, bays, and other navigable waters.

You *must* install secondary containment and diversionary structures to contain oil-contaminated drainage (e.g., rainwater) or leaks from all tank battery and central treating plant installations. Section 112.7(c) lists dikes, berms, curbing, culverts, gutters, trenches, absorbent material, retention ponds, weirs, booms, and other barriers or equivalent preventive systems. Because SPCC requirements are performance-based, you may substitute alternative forms of spill containment if the substitute provides protection that is equivalent to systems listed in 40 CFR 112.7(c). A summary of secondary containment systems is provided at the end of this

The SPCC Plan *must*:

- Be kept onsite.
- Be certified by a Registered Professional Engineer (PE).
- Have full management approval.
- Conform with all SPCC requirements in 40 CFR part 112.
- Discuss spill history.
- Discuss spill prediction (i.e., direction of flow).
- Be reviewed every three years by management.
- Be amended when you change the facility and recertified by a PE.

guide.

Generally, alternative containment systems may be appropriate for an aboveground storage tank (AST) system that has a capacity of less than 12,000 gallons. Alternative containment systems may be inappropriate for:

- Tank systems larger than 12,000 gallons; or

- Systems that consist of several tanks connected by manifolds or other piping arrangements that would permit a volume of oil greater than the capacity of one tank to be spilled as a result of a single system failure.

- ***Secondary Containment Systems***

Berms or retaining walls are commonly used for secondary containment at very large oil storage tank farms. Field production facilities typically use dirt berms for containment in production areas. If you use dirt berms, be sure they contain clay and are adequately compacted. For this reason, this guide includes an expanded discussion on the use of these types of secondary containment.

You should be aware of the following limitations to using dirt for building secondary containment structures.

Erosion - Earthen berms are subject to water and wind erosion and require frequent rebuilding.

Impermeable soil - Sandy soil does not contain oil spills effectively; groundwater contamination may result. Impervious clay liners or synthetic membranes may be required to contain oil spills.

Plant growth - Vegetation inside bermed areas is a fire hazard. Vegetation also restricts the operator's ability to detect spills or defective equipment. Root systems of large vegetation, such as trees or bushes, may degrade the berm and permit leakage.

You may use concrete blocks to build secondary containment structures. However, you should be aware of the following limitations to using these blocks for building secondary containment structures.

- Settling eventually separates or cracks the blocks and destroys the integrity of the wall.

- Concrete blocks and mortared joints are porous making it difficult to provide impermeable containment.

- Because of the freeze-thaw expansion properties of water, ice will penetrate and eventually break the blocks apart.

If you choose to use concrete to build secondary containment structures, reinforced concrete walls are the most effective. Reinforced concrete containment systems are strong, fairly watertight, and resistant to petroleum penetration.

Remember that conventional concrete may absorb petroleum. Any spill left inside a containment area may penetrate the concrete and contaminate groundwater sources. Therefore, clean up spills inside diked areas as soon as they are observed.
Whatever material or method you use for secondary containment, it *must* (1) hold the entire contents of the largest tank located in the containment structure; and (2) be sufficiently impervious to contain spilled oil.

Spill Prevention and Control Measures at Onshore Oil Production, Drilling, and Workover Facilities (40 CFR 112.7[e][5] through [e][6])

Be aware that chemical process solution spills can destroy the integrity of a concrete containment system. Therefore, promptly remove all spills.

- ***Spill Prevention Measures for an Onshore Oil Production Facility (40 CFR 112.7 [e][5])***

Drainage, (e)(5)(ii)(A). The drains at an onshore tank battery production or central treating station production facility should be closed and sealed, except during rainwater drainage. Be certain your Plan addresses drainage operations, including the following specific operations that must take place **before** anyone drains water:

- Visually inspect the diked areas around tanks to ensure that the water does not have an oil sheen and will not cause a harmful discharge;

- Opening, closing, and locking the bypass valve under responsible supervision following drainage; and

- Keeping adequate records of each drainage operation.

Note that a discharge is “harmful” if it will cause an oil sheen upon the water’s surface or a sludge or emulsion deposit beneath the water’s surface. Also keep an adequate record, recording information like the time, date, and employee who performed the operation. Any such record should be made part of, or referenced in, your SPCC Plan and kept for a minimum of three years.

Be certain, too, that your Plan describes the approved methods for picking up, storing, or disposing of any oil accumulated on the water. At regular intervals, staff should inspect any field drainage ditches; road ditches; and oil traps, sumps, or skimmers and remove accumulated oil.

Tank Materials, (e)(5)(iii)(A). Do not use a tank to store oil unless the tank material and construction are suitable for this purpose and for the conditions of storage. Steel is the most common material for an oil production storage tank, and the tank components may be welded, riveted, or bolted together. (Fiberglass is the most common material for constructing a tank for storing an oil-and-saltwater mixture.) Most steel tanks are built with removable clean-out plates that allow workers to repair and clean the tank. Your plan should address tank inspection, repair, and maintenance. Refer to relevant portions of industry standards from organizations such as the American Petroleum Institute (API), National Fire Protection Association (NFPA), Underwriters Laboratory (UL), or American Society of Mechanical Engineers (ASME). State or local regulations (and some other federal regulations) may require that you use these standards. A summary of commonly used industry standards is included at the end of this guide.

Secondary Containment, (e)(5)(iii)(B). Remember that any oil production facility storage tank and any tank battery or central treating plant installation should have secondary containment for the entire contents of the largest single tank; or an alternate system like the ones listed in 40 CFR 112.7(c)(1). There should also be a catchment basin or holding pond to confine undiked area drainage safely.

Visual Inspection, (e)(5)(iii)(C). Periodically, a competent person should examine each tank, including the foundation and supports for any AST. If the tanks sits on a foundation, the person should check for large gaps between the foundation and the tank bottom and for crumbling or excessive cracking in a concrete foundation. The person should also assess whether a storage tank foundation provides adequate support for the tank. If the tank sits directly on the ground, the person should check for large gaps between the ground surface and the tank bottom.

Fail-Safe Engineering For Tank Battery Installations, (e)(5)(iii)(D). Be sure you evaluate fail-safe engineering methods for any old or new tank battery installation, and address this issue in your Plan. Consider each of the following questions.

- ♦ If a tank pumper or gager misses a regular round, is the tank capacity adequate to ensure that a tank will not overfill? High-volume producing wells should have enough storage capacity to handle production yields.

- ♦ Are there overflow equalizing lines between tanks so that a full tank can overflow to an adjacent tank?

- ♦ Does the tank have vacuum protection to prevent tank collapse when oil is removed during a pipeline run? Vacuum vents allow air flow into the tank and reduce the hazard of a vacuum formation.

- ♦ Is a high-level sensor part of a facility computer production control system? Although computer production controlled facilities are uncommon, where such facilities exist, sensors may generate and transmit an alarm signal to a computer.

A summary of level gauging systems and alarms is provided at the end of this guide.

Tank Repair and Maintenance. To prevent leaking, be sure that staff properly maintain tank bolts, gaskets, rivets, seams, and other AST parts; and keep each tank free of cracks and holes. The gasket located between the clean-out plate and the tank also should be inspected periodically, and repaired or replaced when necessary. Staff should keep each oil storage tank free of excessive rust and exterior corrosion (visible on steel surfaces as surface pitting or flaking). An oil storage tank should be cleaned periodically to remove paraffin deposits and sediment. (If there is a wooden tank at your facility and it leaks, has rotted, or lacks structural integrity; you *must* replace the tank. Such tanks can not be repaired.)

Facility Transfer Operations, (e)(5)(iv). Be certain that your Plan addresses procedures for transfer operations because there is a high risk of a spill during these operations. Trained staff should make a schedule and regularly examine aboveground pipes and valves; and flange joints, valve glands and bodies, supports, and metal surfaces. Any defective or leaking equipment should be replaced or repaired. Pumping-well, polished, rod-stuffing boxes should be scheduled for frequent examination, because friction from contact between the box and the rod can cause a leak that develops quickly. When off-load lines or sales outlet connections for crude oil transfer are not in use, close the valves and cap the outlets. To catch small oil spills or leaks, place drip pans and buckets below the outlet or connection.

Examine saltwater (brine) disposal facilities often, and particularly following any sudden change in atmospheric temperature. Frequently examining these facilities is the best way to detect system upsets that could cause an oil spill.

In your facility maintenance program for flowline spill prevention, include a schedule for periodic examination and corrosion protection. Repair and replace flowlines whenever necessary, and keep an adequate record of these repairs in your SPCC Plan for a minimum of three years.

♦ ***Spill Prevention Measures for an Onshore Oil Drilling and Workover Facility (40 CFR 112.7[e][6])***

Your onshore facility's SPCC Plan *must* address oil drilling and workover facility equipment. Be certain to locate and position this kind of equipment to maximize spill prevention potential. Remember always that the goal is to prevent spilled oil from reaching navigable waters, and that you should employ the equipment that is suitable at your facility's locus to intercept and contain spills.

Spill Prevention and Control Measures for an Offshore Oil Drilling, Production, or Workover Facility (40 CFR 112.7[e][7])

In General. Refer to the previous description in this guide of what an offshore oil drilling, production, or workover facility may include. Just like the onshore facilities, an offshore oil drilling, production, or workover facility must have appropriate equipment and procedures for preventing oil spills to navigable waters. Paragraph (e)(7) of 40 CFR 112.7 sets out various spill prevention and control measures that should be addressed in your SPCC Plan for such offshore oil facilities. This section talks about important spill prevention equipment and measures, and inspection and testing measures that should be addressed in the SPCC Plan for a 112.7(e)(7) facility.

♦ ***Spill Prevention Equipment and Measures***

Drainage equipment, (e)(7)(ii). Be sure your Plan covers use of oil drainage collection equipment to prevent and control small oil spills. (Places where you might expect these small spills are around pumps, glands, valves, flanges, expansion joints, hoses, drain lines, separators, treaters, tanks, and allied equipment.) Control and direct drains toward a central collection sump or equivalent collection system. (A system will be "equivalent" if its is sufficient to prevent oil discharges into navigable waters.) If installing a drain or sump is impractical, your operating procedures should address preventing overflow from the collection equipment by removing contained oil as necessary.

Sump Systems, (e)(7)(iii). If you use a sump system at your facility, be sure the system is sized properly. To be certain that you contain all the oil, have a spare pump or equivalent method available.

Oil-Water Separators and Treaters with Dump Valves, (e)(7)(iv). Does your facility have oil-water separators and treaters where the predominant failure mode is in the closed position? If it does, the risk of oil pollution is high, and you *must* install special equipment to prevent spills. If the separator is near shore, consider extending the flare line to a diked area. Other preventative measures could be equipping the separator or treater with a high-level sensor that will shut-in wells producing to the separator; installing parallel redundant dump valves; or using any other feasible prevention measure.

Separators, heater-treaters, and other process vessels are susceptible to many of the same corrosion and leak problems as oil storage tanks. A concrete foundation may crack, crumble, and deteriorate. A vessel base, flowline, valve, joint, or pressure gauge may corrode and leak, also, without proper maintenance.

Be sure that the concrete foundation of a separator is structurally sound; and that separator vessels are free of spill hazards associated with cracks and corrosion. Quickly resolve leaks and drips in flowlines, dump valves, joints, and gauges. Check dump valves regularly to prevent malfunction.

If flarelines vent excess gas pressure from the separator or heater-treater units to a site away from the a tank battery, inspect for spilled oil. Occasionally, flarelines may be the source of spilled oil when the dump valve fails. If you see spilled oil around a flareline, enclose the line with secondary containment.

Atmospheric Storage Tanks and Surge Tanks, (e)(7)(v); Pressure Tanks, (e)(7)(vi); Tank Corrosion Protection, (vii). Equip atmospheric storage or surge tanks with high-level sensing devices or an acceptable alternative. Equip pressure tanks with high and low-pressure sensing devices that will control oil flow by activating an alarm or employing some other suitable/equivalent alternative prevention measure. Any tank used in your SPCC-regulated operations should have suitable corrosion protection.

Surface and Subsurface Well Shut-in Valves and Devices, (e)(7)(x); BOP Assembly, (e)(7)(xi); System Redundancy, (e)(7)(xii); Written Well Servicing Measures, (e)(7)(xiii). Be certain that your Plan describes surface and subsurface well shut-in valves and devices sufficiently for a worker to determine the method of activation or control. Before any worker drills below a casing string, or during a workover operation, be certain that a blow-out preventer (BOP) assembly (and well control system capable of controlling whatever wellhead pressure the BOP may encounter) are installed on the well. (If you have installed subsurface safety valves in a producing well that will not flow out, be sure the installation meets any applicable state law. Also ensure that workers install any casing or BOP according to state requirements.)

For subsurface well shut-in valves and devices, keep detailed records describing the activation system for each well -- even if you don't describe the system in your SPCC Plan.

In anticipation of emergencies like fire, loss of control, or other abnormal conditions, provide for extraordinary well control measures. Look at the hazard exposure and the probable failure consequences in deciding the degree of control system redundancy required.

Make sure you have written measures for contractors and subcontractors servicing a well or any system appurtenant to a well or pressure vessel at your facility. Having these procedures will help your workers and contract employees avoid misunderstanding about who's doing what, and ensure operations that are safe and that prevent oil spills.   Keep these measures at your offshore facility.

Manifolds, (e)(7)(xiv); Pipelines Appurtenant to the Facility, (e)(7)(xv) and Sub-marine Pipelines Appurtenant to the Facility, (e)(7)(xvi). Equip any manifold with check valves on each flowline. Unless the well-head has a pressure relief system to prevent over pressuring, you should ensure that the well-head has a flowline with a high-pressure sensing device and shut-in valve.

Use corrosion protection -- such as a protective coating or cathodic protection -- for any pipeline appurtenant to the facility; especially protect underwater pipelines from environmental stresses and other operations outside your control (e.g., recreational boating) that may threaten pipeline integrity.

♦ ***Inspection and Testing Measures***

If you must install sump systems under 112.7(e)(7)(iii), ensure that your operating procedures cover regular equipment inspection, testing, and maintenance so that the liquid removal system and startup device operate reliably. In fact, under (e)(7)(viii), you should prepare and maintain a written procedure for inspecting and testing all pollution prevention equipment, and keep this procedure at your facility as part of your offshore oil drilling, production, or workover facility Plan. Ensure that these procedures include a regular schedule for inspecting and testing any pollution prevention equipment and systems.

Make sure that the SPCC Plan also includes a regular schedule for inspecting underwater pipelines, per (e)(7)(xviii). These systems, too, must be in good operating condition at all times. Be certain to document your underwater pipeline inspection program, and keep the documentation at your offshore facility.

Visual Inspection and Record-Keeping for Onshore and Offshore Oil Drilling, Production, and Workover Facilities (40 CFR 112.7[e][8])

You *must* ensure periodic visual inspection of tanks, separators, supports, and foundations. Keep records of your inspection and maintenance procedures, and note when workers drained diked areas. Keep these records with your SPCC Plan for at least three years. A summary of inspection and testing program record requirements is included at the end of this guide.

Security (40 CFR 112.7 [e][9])

The SPCC rule requires simple security measures that greatly reduce the risks of accidental releases -- whether accidental (e.g., equipment failure) or deliberate (e.g., vandalism). These measures may include the following:

- ♦ Protecting your facility with full fencing, good lighting, and locked or guarded gates.
- ♦ Installation of devices such as motion detectors and video cameras.
- ♦ Restricting access to your facility during nonbusiness hours.
- ♦ Locking starter controls for fuel pumps and any valves that will allow the direct outflow of product when they are not in use.
- ♦ Capping or blank-flanging loading and unloading connections and pipelines when they are not in use.

Spill Prevention Training Requirements (40 CFR 112.7[e][10])

EPA's Chemical Emergency Preparedness and Prevention Office has prepared an Alert titled *Lightning Hazard to Facilities Handling Flammable Substances.* For a copy, call (800) 424-9346 or (703) 412-9810.

Operator error is the cause of a large number of spills; therefore, train your staff to operate and maintain equipment properly. You *must* properly instruct drivers, tank gaugers, pumpers, and any other operating personnel involved in oil operation systems in the operation and maintenance of equipment to prevent oil discharges; and applicable pollution control laws, rules and regulations. Regularly hold safety and spill prevention briefings to discuss spill events, malfunctioning equipment, and recently developed precautionary measures. Make certain that all your employees are familiar with your SPCC Plan. Have a copy of the Plan available for employee use. You *must* designate one person accountable for spill prevention at the facility.

Some Final Advice about Facility Construction and Design

If you are about to build a new SPCC-regulated facility, consult industry associations that can help you with technical and engineering standards for the design and construction of tanks and pipelines; cathodic protection of tanks and pipelines; AST tank bottom liners; tank inspection, repair, alteration, and reconstruction; tank cleaning; and tank overfill protection. You can use these standards to identify good engineering practices and comply with the SPCC requirements.

Do FRP requirements also apply to me?

EPA estimates that there are about 435,000 SPCC-regulated facilities. Of that number, about 6,500 facilities also are subject to the FRP rule. Your facility is subject to the FRP requirements under 40 CFR 112.20 and 112.21 and associated appendices if it is a high-risk facility that poses a threat of *substantial harm* to the environment. As outlined in 40 CFR 112.20(f)(1), a facility has the potential to cause substantial harm if:

- ♦ It transfers oil over water to or from vessels **and** has a total oil storage capacity, including both aboveground storage tanks (ASTs) and underground storage tanks (USTs), greater than or equal to 42,000 gallons; or

- ♦ Its total oil storage capacity, including both ASTs and USTs, is greater than or equal to one million gallons, **and one of the following is true**:

    - ➢ The facility lacks secondary containment able to contain the capacity of the largest AST within each storage area plus freeboard to allow for precipitation;

- The facility is located at a distance such that a discharge from the facility could cause injury to an environmentally sensitive area;

- The facility is located at a distance such that a discharge from the facility would shut down a public drinking-water intake; or

- The facility has had a reportable spill greater than or equal to 10,000 gallons within the last five years.

You *must* document the determination of substantial harm by completing the "Certification of the Applicability of the Substantial Harm Criteria Checklist," provided as Attachment C-II in Appendix C of 40 CFR part 112. Keep this certification with your facility's SPCC Plan.

Where do I go for more information?

Compliance Assistance Guides

EPA's Compliance Assistance Guides are listed below. You can obtain these guides by contacting EPA Headquarters, any of the 10 EPA Regional Offices, or by visiting EPA's Oil Spill Program Website at **http://www.epa.gov/oilspill**.

- Introduction and Background to the Oil Pollution Prevention Regulation

- Who's Who: Federal Agency Roles and Responsibilities for Oil Spill Prevention and Response

- What to Expect During an SPCC/FRP Inspection

- Facility Response Planning

- Sample SPCC Plan and Sample Containment Volume Calculations

- SPCC Requirements and Oil Pollution Prevention Practices for Bulk Oil Storage Facilities

- SPCC Requirements and Oil Pollution Prevention Practices for Oil Production and Oil Drilling/Workover Facilities

- SPCC Requirements and Oil Pollution Prevention Practices for Farms and Ranches

- SPCC Requirements and Oil Pollution Prevention Practices for Mines and Quarries

- ♦ SPCC Requirements and Oil Pollution Prevention Practices for Electrical Utilities
- ♦ SPCC Requirements and Oil Pollution Prevention Practices for Vehicle Service Facilities
- ♦ Spill Prevention Requirements for Facilities Conducting Large Volume Transfer Operations
- ♦ Spill Prevention and Control for Marinas and Other Waterside Fueling Facilities
- ♦ Oil Spill Notification, Response, and Recovery

SECONDARY CONTAINMENT SYSTEMS		
Type of System	**Description**	**Limitations**
Poured Concrete Walls	Poured concrete walls are strong, fairly watertight, and resistant to petroleum penetration when designed and maintained according to good engineering practices.	• Conventional concrete may absorb petroleum; any spill left inside a containment area may eventually penetrate the concrete and could contaminate groundwater sources. Therefore, clean up spills inside diked areas as soon as possible. • The expansion and contraction of piping that runs through containment walls can create areas of weakness. • Grouting in expansion joints must be maintained to prevent weak points, which may allow petroleum penetration.
Containment Curbs	Containment curbs, which are similar to speed bumps, are often used where vehicles may be in the containment area.	• They fill up with rainwater more rapidly than higher containment areas and they may wear down as a result of vehicle crossings.

SECONDARY CONTAINMENT SYSTEMS		
Type of System	**Description**	**Limitations**
Containment Pits and Trenches	Pits or trenches are below grade containment structures that may be covered with metal grates and lined with concrete.	• Earthen structures could potentially contaminate groundwater unless constructed with appropriate materials. • Pits and trenches deteriorate quickly if not properly supported. • If the grates covering pits and trenches are not properly maintained, pits and trenches become a threat to pedestrians.
Earthen Berms	Earthen berms containing clay or bentonite mixtures are commonly used at very large oil storage facilities.	• Earthen berms are subject to water and wind erosion and require frequent rebuilding. • Sandy soil does not effectively contain oil spills; groundwater contamination may result. Impervious liners of clay or synthetic membranes may be required to contain oil spills. • Vegetation inside bermed areas is a fire hazard. Vegetation also restricts the operator’s ability to detect spills or defective equipment. Root systems of large plants (like trees or bushes) may degrade the berm and permit leaking.
Concrete Block Walls	Concrete block walls are common containment structures.	• Settling eventually separates or cracks the blocks and destroys the integrity of the wall. • Concrete blocks are porous; it is impossible to make a liquid-tight seal between mortared joints. • Because of the freeze-thaw expansion properties of water, water and ice penetrate

SECONDARY CONTAINMENT SYSTEMS		
Type of System	**Description**	**Limitations**
		and eventually break the blocks apart.

LEVEL GAUGING SYSTEMS AND ALARMS	
Type of System	**Description**
Direct Sight Level Gauges	In the simplest system, the gauge is a small-diameter glass or plastic tube vertically attached to two tank shell openings. The level in the tube shows the liquid level in the tank. Another common sight level gauge is a float gauge. In this system, a float rides on top of the liquid in the tank, moving a marker that is attached to a cable or chain on the outside of the tank. The marker moves up or down with the product level in the tank.
Digital Computers or Telepulse	Telepulse is a simple and accurate system for remote supervision of storage tank liquid levels and temperatures. The unit consists of a transmitter and receiver to relay and receive tank temperature and liquid level readings. You can tie-in digital computers to display data at multiple locations. You can also use portable fill alarm systems while liquid cargoes are being transferred from a storage container into a transportation vehicle. Many variations of these systems are in use.
High Liquid Level Alarms	High liquid level alarms are usually tied into a float gauge or level gauging system. The alarms produce an audible or visual signal when the liquid level in the tank reaches a predetermined level. In older systems, the signal is a simple sound produced by air motion.
High Liquid Level Pump Cutoffs	In this system a fill-level alarm triggers a pump control to shut down the pump when a preset liquid level is reached. This system reduces the human failure possibility and is effectively stops tanks from overfilling.
Direct Audible and Code Signal Communication	In this system the tank gauger and pumping station communicate, usually through two-way radio, to determine tank liquid levels and the pumping rates to use to avoid overfilling tanks. Beware: spills can occur when tank gaugers or pumping stations misread an audible or code signal to start or stop pumping.
Additional Safety Features	Most petroleum storage tanks have safety and level control systems with relief valves and overflow lines. Pressure and vacuum relief valves will prevent tank damage but may result in a spill or discharge of liquid. You can send excess liquid into another tank through an overflow line. Vacuum vents prevent a tank from collapsing when liquid is

LEVEL GAUGING SYSTEMS AND ALARMS	
Type of System	**Description**
	pumped out of the tank.

INSPECTION AND TESTING PROGRAM RECORDS	
Type of Equipment	**Inspection and Testing Requirements (Document compliance with these requirements in your records.)**
Aboveground Storage Tanks and Piping	• Conduct regular visual inspections; and test tank integrity regularly. (e.g., shell thickness testing). • Conduct regular visual inspection of pipe supports, pipes, valves and pumps. • Periodically, pressure test high risk spill area piping. • Conduct regular visual inspection of storage tank flow valves, supports, and foundations. • Conduct regular visual inspection of storage tank level gauges and alarms; test the mechanical functions regularly.
Underground Storage Tanks and Piping	• Pressure test tanks and piping. • Monitor the liquid inventory for leaks. • Test the cathodic protection system.
Dikes, Berms, Secondary Containment Systems	• Conduct regular visual inspection of containment dikes and berms. • Record all rainwater drainage from diked containment areas. • Record the date and time of each rainwater drainage; have the employee or manager who performed drainage sign the record. • Keep rainwater free of oil sheen.

SUMMARY OF COMMON INDUSTRY STANDARDS	

SUMMARY OF COMMON INDUSTRY STANDARDS	
Underwriters Laboratory (UL) Standard 142 *Steel Aboveground Tanks for Flammable and Combustible Liquids*	Applies to steel atmospheric tanks intended for aboveground storage of noncorrosive, stable, flammable, and combustible liquids that have a specific gravity not exceeding that of water. Does not apply to API Standard 650, 12D, and 12F tanks.
National Fire Protection Association (NFPA) Code 30A *Automotive and Marine Service Station Code, Chapters 1 and 2*	Applies to automotive and marine service stations and to service stations located inside buildings (special enclosures). Does not apply to service stations that dispense liquefied petroleum gas, liquefied natural gas, or compressed natural gas as motor fuel.
National Fire Protection Association (NFPA) Code 30 *Flammable and Combustible Liquids Code, Chapter Two*	Applies to all flammable and combustible liquids, including waste liquids (except those that are solid at 100 degrees Fahrenheit or above and those that are liquefied gases or cryogenic). (Chapter 2, Tank Storage, applies to aboveground and indoor storage of liquids in fixed tanks and in portable tanks with storage capacities of more than 660 gallons.)
American Petroleum Institute (API) Standard 620 *Design and Construction of Large, Welded, Low-Pressure Storage Tanks*	Applies to large field-assembled storage tanks that have a single vertical axis of revolution; and contain petroleum intermediates, finished products, and other liquid products that the petroleum industry handles and stores.
API Standard 650 *Welded Steel Tanks for Oil Storage*	Applies to aboveground closed-top and open-top welded steel storage tanks that are vertical or cylindrical. Addresses material, design, fabrication, erection, and testing requirements for welded steel storage tanks of various sizes and capacities.
API Recommended Practice 651 *Cathodic Protection of ASTs*	Describes the corrosion problems characteristic in steel ASTs and associated piping systems, and provides a general description of the two methods used to provide cathodic protection.
API Recommended Practice 652 *Lining AST Tank Bottoms*	Describes the procedures for achieving effective corrosion control by applying tank bottom linings to existing and new ASTs .
API Standard 653 *Tank Inspection, Repair, Alteration, and Reconstruction*	Applies to carbon and low alloy steel tanks built to conform with API Standard 650 or 12C. Provides criteria for the maintenance, inspection, repair, alteration, relocation and reconstruction of welded or riveted, nonrefrigerated, atmospheric pressure ASTs after they have been placed in service.
API Recommended Practice 920 *Prevention of Brittle Fracture*	Describes pressure vessel toughness levels to prevent brittle fracture failure.
API Standard 2015 *Safe Entry and Cleaning of Tank*	Provides guidelines for safety practice development for planning, managing, and conducting work in atmospheric and low pressure storage tanks.

SUMMARY OF COMMON INDUSTRY STANDARDS	
API Recommended Practice 2350 *Overfill Protection for Petroleum Tanks*	Provides guidelines for establishing operating procedures and selecting equipment to assist in overfill reduction.
API Standard 2610 *Design, Construction, Operation and Maintenance and Inspection of Terminal and Tank Facilities*	Compiles various standards, specifications, and recommended terminal and tank management practices developed by API and other entities.